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Iowa Farm Science

Volume 23 | Number 4 Article 4

10-1968

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Recommended Citation

Duncan, E. R. and Moldenhauer, William C. (1968) "Wind Erosion - Everybody's Problem," *Iowa Farm Science*: Vol. 23 : No. 4 , Article 4.
Available at: https://lib.dr.iastate.edu/farmscience/vol23/iss4/4

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WIND EROSION... EVERYBODY'S PROBLEM

by E. R. Duncan and William C. Moldenhauer

WIND EROSION is everyone's problem, farmer and city dweller alike. No matter what your standards in gauging a dilemma — money, discomfort, or just plain waste — soil erosion is of major concern to persons far removed from farm boundaries. But this form of erosion is the farmer's responsibility, and the decision to control it must start right on the farm.

Effects of wind erosion can be seen in fencerows, road ditches, on land planted to crops, in the farm and city home, and can be felt in the sneezes, coughs, and discomfort of man and animals. Blowing soil and dust disturbs the housewife, may be dangerous to the highway traveler, mars the beauty of the landscape, and at times is a major pollutant of the air we breathe.

Money spent to combat these effects comes out of everyone's pocket. Drainage inlets in road ditches must be opened. Accumulated soil from road ditches and fencerows bordering roads must be removed. These costs are charges to the taxpayer. Large amounts of soil nearly obliterating fencerows and making them useless on farms have to be bladed away. Dust entering machines may shorten their life span. Dust entering the sensitive nostrils of men and animals reduces their efficiency. And these costs are borne by the farmer.

It would seem apparent that farmers have a responsibility to themselves, to their neighbors, and to the general public to be aware of the causes of wind erosion, of

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ways to control it, and to take required action to correct it. Answers to the first two questions are available—causes and methods of control. But farmers must take action themselves.

Causes of Wind Erosion

In an attempt to remain competitive in a time of low farm product prices and increasing costs, farmers have inadvertently created conditions favorable to wind erosion, though it does not exhibit itself every year. Conditions favoring wind erosion have become increasingly prevalent since the early 1960's. These are largely due to a rapid increase in row crop acreage — soybeans instead of oats — and to increased farm size.

The problem is with us every year, but sometimes it can reach serious proportions. The early spring of 1968 was such a time. Wind erosion that year brought with it air pollution, highway safety hazards, waves of drifting soil, and the side effects of weed seeds and chemical residues moving into adjacent fields. Crop yields apparently have not been affected directly by wind erosion, but there have been cases where young corn plants have been cut off by blowing sand particles.

There are two primary causes of wind erosion: persistent high velocity winds and dry, residue-free land surfaces. We can't change the weather, but we can recognize it as the main factor causing the problem. Table 1 shows the wind direction in Iowa for velocities over 12 miles per hour.

The most mobile soil particles will start to move on plowed land, and erosion begins when wind speeds reach 13 miles per hour. At Des Moines and in western Iowa, the dominant speeds above 12 mph tend to come from a north to northwesterly direction. Winds may come from any direction, but the greater percentage of high velocity winds in the spring come from the directions shown in Table 1. Only a small percentage of winds moving at more than 12 mph occur from May 1 to Nov. 1. Wind erosion control is needed from Nov. 1 to May 1 and especially in March and April when the soil surface is dry and free of snow.

Normal fall and spring rains and winter snow cover usually hold down wind erosion in Iowa. An "open" winter creates conditions favorable to erosion.

There is no sound evidence that either corn or soybeans yield differently in rows planted in certain directions. There does appear to be some advantage from east-west rows in reducing erosion from wind, but the advantage of these over north-south rows is not consistent within a year or between years. However, in most years the east-west direction is most desirable except in southeast Iowa. In all cases, the most desirable row direction is at right angles to the highest velocity wind direction. Where a full choice is possible, a southwest-northeast direction would be most favorable (Figure 1).

The second primary cause of wind erosion — residue-free soil surfaces — can be greatly influenced and controlled by the farmer. Iowa cropping patterns have changed dramatically since 1957, with a sharp increase in acres of row crops (Table 2).

Participation in the acreage allotment program has held corn acreages in check. It has, however,

Table 1. Wind direction, speed and frequency.

Month	Direction	Percent of Winds Traveling: 13-24 mph	28-38 mph
February	WNW	4.5	1.5
	NW	5.5	1.5
March	N	5.0	1.0
	NNW	4.0	1.0
	NW	5.5	2.0
	WNW	4.0	1.0
April	N	5.0	1.0
	NNW	4.0	1.0
	NW	5.5	2.0
	WNW	4.0	1.0

Table 2. Approximate Crop acres in Iowa, in Millions.

Year	Oats	All Hay	Corn	Soybean
1957	5.1	2.5	10.2	2.8
1962	2.9	2.2	10.1	3.7
1966	1.7	2.0	10.9	5.4

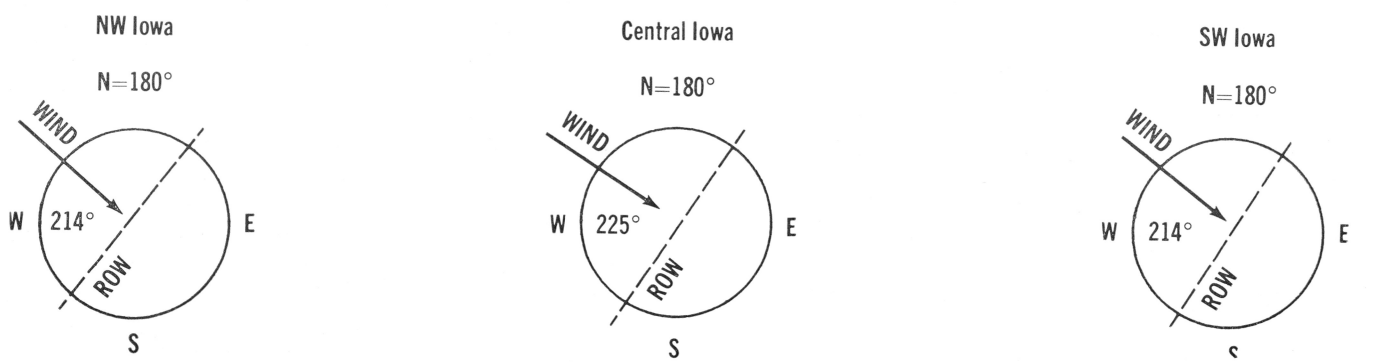
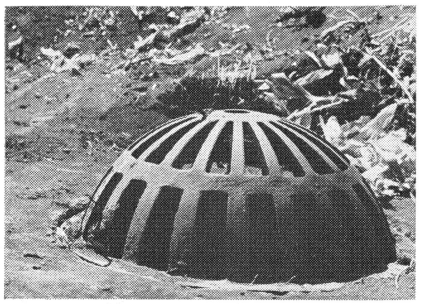


Fig. 1. Prevailing Wind Direction in March and April.

THE RESULTS of wind erosion are costly to everyone. Along highways, blowing soil is a hazard and must be removed at public expense.

UNWELCOME DEPOSITS of soil must also be removed from fence rows, often at the farmer's expense. Blowing soil also affects man, animals and machinery.



DRAINAGE systems are another victim of soil erosion. Unless cleared of choking silt, further complications result.

ONE ANSWER to soil erosion is a tillage system that allows crop residues to remain on the soil surface throughout winter and spring months.

WITH CERTAIN types of tillage, a rough surface can be left even after spring planting to check wind or water erosion. Then soil creates production, not problems. Note that no crop residue remains over the rows. Early planted seeds germinate and emerge more slowly with residue over the planted row.

promoted an increase in soybean acreage — which is primarily responsible for our growing wind erosion problem. There is no particular problem while the crop is being grown, but after harvest and before the next year's crop is planted, this soil is most vulnerable to wind and water erosion, especially when plowed. The loosening effect of soybeans on the soil isn't well understood, but it happens, and erosion follows.

The most severe wind erosion problem is in the northwest quarter of Iowa and on the Missouri River bottom. These areas of the state have the greatest acreage of row crops and the greatest amount of fall plowing. With increased recognition of the need for early planting of corn, even greater emphasis has been placed on fall plowing. Since soybeans are harvested early and this land normally is planted to corn the following year, it's natural to plow soybean fields early in order to spread the work load.

But plowing soybean stubble for corn isn't necessary — at least in northwest Iowa. Soybean land, double-disked in the spring will yield about as much corn on land that is either spring or fall plowed (Table 3). In addition to saving the time and cost of plowing, soybean residue on the soil surface is an effective deterrent to wind erosion and helps reduce water erosion as well.

The corn yields in Table 3 were relatively low due to below-normal rainfall; but the method of seedbed preparation did not cause appreciable differences. To obtain best erosion control and prevent planting problems, equip the soybean combine with a chopper and a straw spreader for uniform distribution of the residue. For most effective seedbed preparation in the spring, allow residues to dry before disking.

Standing corn or sorghum residue left over winter will effectively deter wind erosion when spring plowed on loam, silt loam, silty clay loam, and clay loam soils. Soybean residue in 30-inch or narrowed rows will probably give adequate protection when well distributed and left on the soil surface until spring.

A rough soil surface also helps to control wind erosion. Rough plowing or ridging the soil with a spring-tooth harrow or cultivator can be helpful before erosion starts. Unfortunately, rough plowing isn't popular, though a smoothly plowed field is no longer the mark of a good farmer.

Once wind erosion starts, little can be done to control it. Temporary control is possible by using a spring-tooth harrow or other tools that leave maximum ridge roughness perpendicular to the to the wind direction. Strip tilling the field is seldom adequate, and disking may leave the soil less resistant to wind damage than before. Ground speeds greater than 4 mph reduce the effectiveness of any tillage implement in controlling wind erosion. Even chisel type tools are seldom effective on mellow soybean land.

What You Can Do?

Control measures are simple and straight forward — and require little or no financial sacrifice. The most effective measure would be elimination of plowing or tilling of soybean stubble that will be planted to corn. Present information shows that when a chopper or straw spreader is used on the combine, a satisfactory seedbed for corn can be prepared in the spring without plowing and with less cost.

Where possible, keep rows at right angles to the prevailing high winds. For the western half of Iowa, rows should run east and west for greatest protection in March and April.

Strip cropping is an alternative for controlling both wind and water erosion. Minimizing tillage so that residues remain on the soil surface gives adequate control on most fields. However, surface residues incorporated in the planted row keep soil temperatures low and delay seedling germination and emergence. A clean-tilled weedfree seedbed with a rough surface and residues between the rows is most desirable.

Rough plowing in the fall, with some residues exposed, is often an effective deterrent to wind erosion. Unfortunately, it is difficult to rough plow soybean land, especially with plows having 5 or more bottoms and at plowing speeds over 3 miles per hour. A better choice is to avoid plowing soybean stubble.

The choice of primary tillage-implements is important in erosion control. The modern disk (disk harrow) makes a fine seedbed and firm planting surface, but it dries the surface, fostering rapid weed emergence and erosion. A field cultivator or a spring-tooth harrow or similar equipment operated at right angles to the prevailing wind direction leaves a rough surface that is unfavorable to weed growth and resistant to soil movement — but is favorable to the planted crop.

In areas where fall plowing of corn or sorghum land is necessary, leaving strips of undisked and unplowed residues in a ratio of one part unplowed residue to 4 or 5 parts plowed may lessen wind erosion. A minimum residue strip of 25 feet is believed to be necessary. In practice, leaving 8 rows of corn or sorghum residue for each 40 rows plowed may do an adequate job of erosion control on these crops. On sandy or muck soils, the plowed strip will need to be narrower to do a satisfactory job.

Summary

The most important part of wind erosion control is to recognize the problem and act in a responsible way to eliminate it. Not plowing soybean stubble is a simple, cost-saving first step. Other measures may be needed. Each farmer must decide what is required for his soil and cropping pattern. Only the farmer can control wind erosion on his land; it is his responsibility and there are effective ways of getting the job done.

Table 3. Corn yields following soybeans.[1]

Seedbed Preparation	Corn Yields in Bushels				
	1964	1965	1966	1967	Average
Disk only	105	86	94	74	91
Fall plow	105	84	97	79	91
Spring plow	105	85	96	80	92

[1]Gavla-Primghar Experimental Farm, Sutherland, Iowa.